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ABSTRACT

A survey of the discharge status of institutionalized educable mentally retarded patients who had been studied with the Kohs Learning Potential (LP) assessment measure in the early 1960's was undertaken. Learning potential was strongly associated with the fact of discharge. The more able patients by the learning potential criterion also had higher scores on various performance ability measures but these higher scores were not systematically related to discharge status. Among patients institutionalized below 11 years of age, high learning potential status Ss had been discharged, whereas less able (LP) patients were not. A multiple regression analysis indicated that the Wechsler Intelligence Scale for Children full scale IQ, age entered, and immediate post-training scores on the Kohs LP accounted for 35% of the variance associated with discharge. (For related studies, see also EC 042 064 and 042 067.) (Author)

STUDIES IN LEARNING POTENTIAL

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Budoff and his associates (1969, 1970) have developed and provided validation for a Learning Potential assessment procedure which may be used as a substitute for traditional IQ tests with children psychometrically defined as educable mentally retarded (EMR). In Learning Potential assessment, intelligence is defined as the ability to profit from experience, especially in relation to reasoning problems. Typically, the individual is pre- and post-tested on a nonverbal reasoning task (e.g., Kohs Block Design) after an interpolated period of tuition on principles applicable to solution of the task. Within the trained samples, there is a marked spread in the ability of the coached EMRs to profit from this learning experience. Some EMRs markedly improve their scores following coaching (gainers); while others do not (nongainers). Psychometrically defined EMRs who performed very well on the task prior to coaching were designated as high scorers.

Budoff and his associates have reported data which indicate consistent differences in performance within the narrow IQ-defined EMR range on various types of ability and motivational variables, and in response to a nonverbal science curriculum (Budoff, Meskin, and Harrison, 1971). On the basis of these data, we have hypothesized that gainers and high scorers with IQs in the EMR range may

be educationally rather than mentally retarded.

Further support for this hypothesis can be derived from studies of the post school adjustment of individuals defined as EMRs during their childhood or early adolescent years. While a psychometrically defined EMR population may demonstrate little aptitude for the usual school program, the evidence (Kennedy, 1948, 1960; and Mudd, et al., 1968) indicates that from two-thirds to four-fifths of persons defined psychometrically as "EMRs" during their school years attain economic and social independence as adults. This is in marked contrast to the assumptions underlying their schooling or vocational training in community special classes or institutions. These school-age diagnosed "EMRs" do have severe academic difficulties. Ability to profit from experience on Learning Potential assessment, which taps non-academically dependent abilities to reason and learn, should be reflected in satisfactory job attainments, and associated with a higher incidence of social and economic independence.

The present paper explores the relationship of Learning Potential to later adult adjustment by surveying the discharge status of patients seen at a state residential school for the retarded during 1961 to 1964. Budoff (1967) summarized the data on these samples who were then over 16 years of age. Gainers and high scorers had higher performance scale than verbal scale IQ scores on Wechsler tests, attained scores in the nonretarded ranges on the Raven's Progressive Matrices (most commonly above the tenth percentile), and learned more rapidly and with fewer errors on paired associate and double-alternation tasks than those

who do not improve their scores (nongainers).

In the spring of 1970, a tally was made by the institutional staff of the residents who had been discharged or were still in residence at the institution (Belchertown State School). This paper relates this discharge data to the Learning Potential status obtained at the time of the earlier studies and to the psychometric and learning data available on these Ss at that time. Essentially, we were concerned with whether the differences in learning potential status obtained from residents of the institution in the early sixties related to subsequent discharge into the community. There had been no contact of any kind between the research team and the institutional staff and patients during this period.

Method

Description of Sample.

During the years 1961-64, studies were initiated at the institution to develop the Kohs Learning Potential procedure. The first samples were drawn from the total population of residents who ranged in age from 16 to 25 years. In these initial studies (Budoff and Friedman, 1964; Budoff, 1967), the Kohs block designs were administered to large samples of residents (IQs 50-79). Pairs were drawn matched for sex, CA, IQ, and pre-test Kohs score; one member was randomly assigned to the block design training condition; the other served as an untrained control. During 1963-64, after these initial studies, near-total samples of residents, aged 10 to 16 years were administered the Kohs LP procedure.

Learning Potential status is defined by response to an enlarged

version of the Kohs Block Designs (1923) administered 3 times; prior to, one day, and one month following an individual training session which teaches principles appropriate to solving these problems. Patients whose post training score was 4 or more designs higher than their pretest score were classified as gainers; those who showed a smaller improvement, were nongainers. Those individuals who solved difficult nine block problems prior to training were classified as high scorers. To expand the study pool, residents who had not been trained but who had spontaneously attained high scorer or gainer status, i.e., either posttest score was 4 or more designs higher than their pretest without training, were included in this study sample (see Budoff and Friedman, 1964, for details of the training and assignment procedure).

The institutional clerks surveyed the records of the 90 residents with Learning Potential designations, and recorded whether they were in residence at the State School, and/or their last known disposition. Individuals were considered discharged if they had been formally discharged from the institution, were living on a supervised pre-discharge placement outside the institution, or had left the institution without permission but had not been returned. The non-discharged sample included those still in residence at the State School, or those transferred to another custodial institution, e.g., a state hospital or state school for the retarded.

Results

Table 1 presents means and standard deviations for the 90

TABLE 1. MEANS AND STANDARD DEVIATIONS FOR CHRONOLOGICAL AGE AND INTELLIGENCE QUOTIENT OF THE STATE SCHOOL STUDENTS, SUBDIVIDED BY LEARNING POTENTIAL STATUS, SEX AND DISCHARGE STATUS.

LEARNING POTENTIAL STATUS	DISCHARGED				NON-DISCHARGED			
	MALE		FEMALE		MALE		FEMALE	
	CA	IQ	CA	IQ	CA	IQ	CA	IQ
High Scorer								
M	299.875	75.500	314.333	73.222	322.000	72.000	236.000	73.000
S.D.	24.457	5.952	35.302	7.902	-	-	-	-
N.	8		9		1		1	
Gainer								
M	273.857	67.714	307.667	74.133	272.625	57.000	269.167	64.833
S.D.	44.115	8.864	31.878	10.439	60.895	8.142	41.315	6.113
N	7		15		8		6	
Non-Gainer								
M	280.250	63.250	318.333	71.333	255.118	59.647	302.000	59.375
S.D.	41.892	12.580	13.125	10.405	52.516	9.387	83.952	11.426
N	4		6		17		8	

residents and ex-residents for whom learning potential data was available. Chronological age was calculated as of June, 1970, at the time the survey regarding discharge from the institution was made; IQ scores were available on the individuals at the time of the original data collections. There were no statistically significant differences in chronological age among the three learning potential samples ($F_{2,\ 78} = 1.732$, $p = .184$). Consistent with Budoff's findings with community special class adolescents still in school (1970) and institutional Ss (1967), the high scorers' and gainers' mean IQs were higher than those obtained by the nongainers ($F_{2,\ 78} = 10.650$, $p < .001$). There were also marked sex differences. The girls in each learning potential group were older ($F_{1,\ 78} = 8.316$, $p < .005$) and had higher mean IQs ($F_{1,\ 78} = 6.271$, $p < .014$). The mean age of the discharged sample was older than that of the non-discharged sample; (means of 299.21 [±33.866] and 270.90 (± 59.96) months, respectively; $F_{1,\ 78} = 3.965$, $p < .05$), and their IQs were higher (72.05 [±10.33] and 60.463 [±9.35], respectively; $F_{1,\ 78} = 14.324$, $p < .001$). There were no significant interaction effects for learning potential X discharge status for either the age or IQ variables.

Table 2 indicates the distribution of discharged and non-discharged young adults subdivided by learning potential status. While 90% of the high scorers were discharged, 71% (25 Ss)of the nongainers were either still in residence at the state institution, had been discharged to a state hospital or another institution for the mentally retarded ($X^2_{2df} = 20.06$, $p < .001$). The gainers were evenly split on this criterion. The most able LP Ss (high

scorers) had been discharged while those categorized as least able (nongainers) by the LP measure tended not to be discharged.

Psychometric Correlates of Learning Potential and Discharge Status.

The means and standard deviations are presented in Table 3 for the Stanford-Binet, Wechsler verbal, performance, and full scale IQs by Learning Potential groups and discharge status for Ss with all these scores available. The scores were subjected to

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Insert Tables 2 and 3 about here

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an analysis of variance design in which LP (3 levels) and discharge status (2 levels) were the between-Ss variables. Each IQ score was analyzed separately.

Differences by Learning Potential status were significant for Wechsler performance and full scale IQs but not for Stanford-Binet or Wechsler verbal scale IQs (see Table 3). Discharged individuals had higher IQs on all four measures. There were no significant interactions of LP X discharge status. The performance scale IQs of the discharged gainers were in the dull normal range, as were those of the high scorers, whether discharged or not. This was not true for the discharged nongainers whose four mean scores were in the retarded ranges. Stanford-Binet IQs were lower than Wechsler verbal scale IQs, measures that tend to approximate each other among community special class EMRs for the various levels of LP status.

Raven's Progressive Matrices (series A, A_B, B, C, D, E), a nonverbal measure of reasoning ability, had been group administered to Ss then over 16 years of age. The only differences were a

Table 2

LEARNING POTENTIAL STATUS

OF THE DISCHARGED AND NON-DISCHARGED INDIVIDUALS

	High Scorers	Gainers	Non-gainers	Total
Discharged	18	20	10	48
Non-discharged	2	15	25	42
Total	20	35	35	90

$\underline{X}^2 = 20.06, \quad \underline{p} < .001$

Table 3

Means and Standard Deviations of Wechsler Scale and Binet IQs

by Learning Potential and Discharge Status

LP Status:		Discharged				Nondischarged			
High Scorer		Verbal Scale IQ	Perform. Scale IQ	Full Scale IQ	Stanford Binet	Verbal Scale	Perform. Scale IQ	Full Scale IQ	Stanford Binet
	M	71.71	91.57	79.00	66.29	65.50	85.50	72.50	61.00
	SD	8.46	8.87	8.35	6.05	6.36	9.19	0.71	5.66
	N	7				2			
Gainer									
	M	71.20	87.33	76.93	66.33	61.33	69.11	62.11	56.56
	SD	7.46	8.78	7.47	8.10	7.95	10.56	9.01	8.41
	N	15				9			
Nongainer									
	M	70.44	70.78	69.67	60.67	66.00	62.13	61.25	56.75
	SD	11.72	11.54	11.47	8.60	8.05	12.90	10.75	8.96
	N	9				8			

function of Learning Potential status. That is, the more able Ss, by the LP criterion (gainers and high scorers) attained higher scores than the less able (nongainer) Ss (mean raw scores were 34.16 and 24.50 respectively; $F = 4.532$, $p < .05$). There were no differences by discharge status.

Discharge Status and Age at Admission.

The discharge rate was significantly higher for those Ss who had been admitted when they were 11 years or older, as compared to the discharge rates of those who were 10 years of age or younger when admitted, ($X^2_{1df} = 10.34$, $p < .01$). Discharge status was clearly associated with LP status in both groups, the effect being stronger in the sample institutionalized at the younger age ($X^2_{\text{linear component}*(1df)} = 11.51$, $p < .001$) than the older group ($X^2_{\text{linear component, 1df,}} = 3.60$, $p < .05$)(see Table 4).

A stepwise multiple regression**analysis was run to find the best predictors of discharge from the instititon. The variables included were Learning Potential, chronological age, initial (K_1) and immediate posttraining (K_2) Kohs scores, age entered institution, WISC full scale IQ, and Stanford-Binet IQ. The variables were entered freely with no restraints set by the experimenter. The final sample consisted of 71 subjects. Subjects with missing data were eliminated from the analysis.

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*Learning Potential hypothesizes a linear continuum of ability from most able (high scorers) to least able (nongainers).

**Biomedical computer programs - #BMD02R.

TABLE 4 - RELATIONSHIP BETWEEN LP AND DISCHARGE STATUS AND AGE AT INSTITUTIONALIZATION

	≤ 10 years		>10 (11 to 21 years)	
	Discharged	Non-discharged	Discharged	Non-discharged
High Scorers	4	1	6	0
Gainers	8	9	13	5
Nongainers	1	15	8	6
N =	13	25	27	11

$X^2_{2df} = 11.46$, $p < .001$

$X^2_{\text{linear component (LP)},1df} = 11.41$, $p < .001$

$X^2_{2df} = 3.77$, < 20, $p > .10$

$X^2_{\text{linear component (LP)}, 1df} = 3.60$, $p < .05$

WISC full scale IQ was the best predictor of discharge from the institution, accounting for 30.5% of the total variance. The higher the IQ score the more probable a subject would be discharged.

Age entered institution and immediate posttraining Kohs were the next most powerful predictors adding 3% and 2% respectively to the variance accounted for by regression. Neither variable improves the multiple R at a statistically significant level, although "Age Entered" comes close ($F = 3.408$, $p < .10$). The multiple regression equation which accounted for 35% of the variance was significant at the .01 level (discharge = 2.9966 - .0167 WISC - .02164 age - .02467K2)($F = 12.094$ df 3,67; $R^2 = .351$).

Discussion

These data indicate that performance on nonverbal measures of ability do relate to and predict discharge from the institution. While the WISC full scale IQs accounted for a major proportion of the variance relating to discharge, the major share of the variance must be attributable to the differences in performance scale IQs. There was a very narrow spread of scores on the verbal scale and the Stanford Binet, and the means were clearly in the retarded range. The performance scale IQs showed considerable spread, and the higher the performance scale IQ the more likely the young adult had been discharged. The young adults who attained higher performance scale IQs also showed marked ability on the Learning Potential assessment. The two criteria appear to be measuring the same ability when the learning situation makes minimal verbal response demands. A multiple regression analysis which included

Learning Potential status and immediate posttraining Kohs scores (K_2) but not IQ scores, indicated that the two factors accounted for 10% and 11%, respectively of the variance related to discharge status.

It may be that greater use of performance types of measures may reconcile a curious dissonance in the findings relevant to school-age children psychometrically defined as EMRs. When identified, the children are placed in special classes and vocational training programs that reflect the bias that they have such limited capacity to learn that even such nonverbal manipulative courses as shop are often denied them. Yet, after leaving school, the overwhelming majority attain economic and social independence as adults. Kennedy's studies (1948, 1960) indicate that a large proportion continued to improve their blue collar skill levels. While their first jobs tended to be semi- and unskilled rather than skilled (54.9%, 15.6%, and 13% respectively), after a lapse of 10 years in the job market, 32.7% were in skilled positions; only 32% and 11.1% in semi- and unskilled jobs, respectively. The proportion in professional and semi-professional positions increased five fold (from 1.2% to 5.6%).

The results of this study suggests that performance types of measures, including Learning Potential assessment, provides evidence of ability that may predict later vocational adequacy. Demonstrated competence on these types of measures has been systematically ignored in developing educational and training plans for children who attain low scholastic aptitude scores (low IQs)

and have failed to progress satisfactorily in school. These individuals have serious educational problems. But many can competently acquire skills and learn from experiences when these are minimally dependent on reading or verbal-conceptual-expressive skills. A school program based on finding ways to utilize these reasoning skills early in the child's life might prevent the subsequent school failure, and the presumed diagnosis of mental retardation.

If these findings with the discharge status variable are supported with more substantive evidence of vocational and social adequacy, the strong possibility exists that the more able students by the performance IQ measure and the learning potential criterion were misclassified as mentally retarded. Their low IQ represents their scholastic failure more than their inability to profit from appropriate experience.

However, it should be clear that while ability factors such as learning potential and the performance measures account for the substantial proportion of those discharged, there were low ability individuals who were discharged and high ability individuals who were not. It is likely that the institutional staff considered factors related to emotional stability and emotional control as critical to successful outside adjustment. These data were not available for these analyses. The two domains of intellectual ability, more broadly defined, and emotional stability, together probably account for the successful attainment of economic and social independence as adults. Any further study of factors related

to institutional discharge should clearly include data from both domains, and provide for follow-up visits. Evidence from a project in Milwaukee indicates that, as with mental hospital patients, some considerable proportion of school-age defined retardates require post-discharge support and guidance in order to develop stable and satisfying personal lives outside the work situation.

The learning potential distinctions were most powerfully related to subsequent discharge among persons who had been institutionalized prior to adolescence. Physically damaged individuals who tended not to profit from Learning Potential training are institutionalized at younger ages. Those institutionalized in adolescence tend to be chronic school failures, often with some delinquency involvements, come from poorer homes, are probably not bonafide mental retardates although they have had considerable difficulty in school. The incidence of misclassification as mentally retarded is probably greatest among these adolescents since their placement is for social management purposes, and the low IQ score permits placement in an institution for the retarded, a finding reported by Windle (1962).

This survey is part of a larger concern with the relationship of learning potential status to post school adjustment in the community. A study, presently underway, is investigating a broader range of questions related to the post school adjustment of former special class students in various Massachusetts communities who had been studied with the learning potential measure during the first half of the sixties.

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